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Appln. No. 10/763,734  
Amendment dated March 20, 2007  
Reply to Office Action mailed December 20, 2006

**REMARKS**

Reconsideration is respectfully requested.

Claims 1 through 21 remain in this application. No claims have been cancelled. No claims have been withdrawn. Claim 22 has been added.

The Examiner's rejections will be considered in the order of their occurrence in the Office Action.

**Paragraphs 4 through 7 of the Office Action**

Claims 1 through 7, 11, 13 through 16 and 20 have been rejected under 35 U.S.C. §102(e) as being anticipated by Oh.

Claims 8, 9 and 17 have been rejected under 35 U.S.C. Section 103(a) as being unpatentable over Oh in view of Ebata.

Claims 10 and 18 have been rejected under 35 U.S.C. Section 103(a) as being unpatentable over Oh in view of Wells.

Claims 12 and 19 have been rejected under 35 U.S.C. Section 103(a) as being unpatentable over Oh in view of Watkins.

Claim 1, particularly as amended, requires "locating an unused portion of disk storage space on a disk drive of each of the at least two grid computers connected by the connecting network of the computing grid" and "presenting, as a single combined virtual storage drive on at least one computer, a portion of the unused portion of the disk storage space from the disk drive of each of the at least two grid computers" (emphasis added).

It is stated in the Response to Arguments portion of the pending Office Action that:

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With respect to (a), the Oh prior art does teach a single virtual storage drive (i.e. the exported memory partition) as described in paragraph [0025]. Furthermore, Oh prior art teaches clearly teaches the exported memory partition becomes a new layer (i.e. a single virtual storage drive). Just for sake of argument, even if Examiner agree with Applicant's interpretation, i.e. the Oh prior art teaches about creating a new layer for each exported memory partition, the Oh prior art still reads on the pending claims because claim 1 can also be interpreted as following: the limitation "locating an unused portion ... of computing grid" means locating an unused portion of the total disk space on disk drives of each of the two grid computers; and the limitation "presenting a portion of the total disk ... on at least one computer" means presenting a portion of the total disk space of each of the two grid computers as a single virtual storage drive, i.e. a single virtual storage drive is created for each of the two grid computers using a portion of the total disk space of each of the two grid computers.

It is submitted that the language of claim 1, especially as amended, distinguishes the invention over the scenario set forth in the Office Action, as claim 1 requires that the "single combined virtual storage space" comprises the "unused portion of the disk storage space from the disk drive of each of the at least two grid computers".

In greater detail, the rejection of claim 1 in the Office Action states:

As per claim 1, Oh teaches a method of creating a virtual disk storage (i.e. the extra layer of storage in the memory hierarchy between the main memory and the hard disk) construct using disk storage consolidated from at least two grid computers (i.e. from multiple exporters) of a computing grid utilizing a connecting network (i.e. via network as shown in Fig. 2), comprising: locating an unused portion of a total disk storage space on at least one disk drive of each grid computer of the at least two grid computers (i.e. partition from at least two exporters) connected by the connecting network (i.e. via network as shown in Fig. 2) of the computing grid; and presenting, on at least one computer (i.e. the importer), a portion of the unused portion (i.e. the unused memory partitions; see paragraph [0020]) of the total disk storage space of each of the at least two grid computers as a single combined virtual storage drive (i.e. the aggregated remote memory having the additional layer made of the plurality of the remote memory partitions) (e.g. see paragraphs [0020], [0023] and [0025] and Fig. 2).

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Looking to the referenced portions of the Oh published patent application, paragraph [0020] states:

[0020] Memory Partitions on Demand (MPD) is a remote memory allocation mechanism that allows computers in an infrastructure to contribute their unused memory partitions to other computers. The idea is similar to contributing CPU cycles of under-utilized computers in load-balancing of GRID architecture and Internet-based distributed computing, but in this case the shared resource is the main memory.

This portion of the Oh patent application does not provide any indication to one of ordinary skill in the art that any memory taken from multiple computers is presented as a single combined anything. The rejection also refers to the Oh application at paragraph [0023], which states (emphasis added):

[0023] Case 2. Attaching imported memory as an additional memory hierarchy layer between the local memory and the local hard disk using PPVM. The attached remote memory partitions function as an additional layer in the memory hierarchy between the local memory and the hard disk (FIG. 2). This additional layer is a per process entity, i.e., it only exists for the process importing remote memory. If the process uses up the imported memory, it can find more memory partitions over the network and aggregate the new partition with the existing memory partitions. The additional remote memory reduces disk access frequency.

This portion states that the "attached memory partitions function as an *additional layer*", and although the paragraph says that a new partition is "aggregated" with the existing memory partitions, this does not establish that the new partition and the existing memory partitions are "present[ed] as a single combined virtual storage drive" as required by claim 1.

Further, paragraph [0025] of the Oh patent application states (emphasis added):

[0025] FIG. 2 shows the MPD concept for Case 2 above, i.e., the concept of MPD in a paged-memory system by adding an extra layer in the memory hierarchy between the main memory and the hard disk. A machine 10 borrows two memory partitions from a machine 20 over the network. Although only one memory exporter is shown in the figure, the mechanism allows importing multiple partitions from multiple

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exporters so that the aggregated remote memory can be huge. The exporter's exported memory partition becomes a new layer in the importer's memory hierarchy.

Considering the referenced portion of the Oh patent application, in the context of the remainder of the application, it is submitted that one of ordinary skill in the art would not be led to "presenting a portion of the total disk storage space of each of the at least two grid computers *as a single virtual storage drive* on at least one computer". More specifically, the Oh patent application discusses an "extra layer in the memory hierarchy between the main memory and the hard disk". It is submitted that, rather than suggesting the presentation of a "single virtual storage drive" as required by claim 1, one of ordinary skill in the art would understand the Oh patent application as discussing an invisible "layer" of memory on a machine receiving the memory partition. Further, the Oh patent application discusses this in the context of memory partitions from a single computer, it states that partitions from more than one machine may be employed, but does not disclose how memory partitions from different computers would be presented. The discussion in paragraph [0025] suggests that each "exported memory partition" becomes "a new layer" on the memory importer, suggesting that there is no unified presentation of the memory partitions from different computers, but as separate, distinct layers. It is submitted that this discussion is more likely to lead one of ordinary skill in the art to understand that the "imported memory partitions" remain distinct on the importing computer, rather than leading the skilled in the art to "*presenting* a portion of the total disk storage space of each of the at least two grid computers *as a single virtual storage drive* on at least one computer". Significantly, it is noted that the Oh application does not state that the "imported memory partitions" become "a new layer". Further, it is noted that as the Oh patent application states that the exported memory partition becomes a "new layer" in the memory "hierarchy", which suggests to one of

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ordinary skill in the art that the imported memory partition remains as a separate and distinct element, and not a portion of the single whole.

Claim 3 requires "reserving a portion of the total disk storage space on each of the at least two grid computers for local use". Claim 15 similarly requires "implementing the step of reserving a portion of the total disk storage space on each of the at least two grid computers for local use". It is contended in the Response to Arguments portion of the Office Action, it is stated that:

With respect to (b), Oh teaches that only the unused memory partitions are assigned/contributed to the other/remote computers/grids (e.g. see paragraph [0020]). Therefore, at least a portion (i.e. the used memory partition) of predetermined size (i.e. the size of the used portion) of the total disk storage space are inherently reserved for local use on each of the at least two grid computers. According to the Oh prior art, the unused memory is available for contribution to other computers (i.e. for the virtual storage drive). In other words, the used portion of the memory is not available for the other grid computers, i.e. it is reserved for the local use and the inclusion of it in the single virtual storage is avoided.

However, it is submitted that the discussion in the Oh patent application of only using unused memory partitions does not communicate to one of ordinary skill in the art that there is any "reserve[ation of] a portion of *predetermined size*... for local use on the respective grid computer" as required by the claims. One of ordinary skill in the art recognizes that the "unused memory partitions" in a computer will vary from moment to moment, and thus is not a "predetermined size". It is submitted that one of ordinary skill in the art recognizes that "unused" is not a "size", and certainly not a predetermined size. The interpretation of "unused memory partitions" as having a "predetermined size". renders this portion of the claim meaningless, as one of ordinary skill in the art recognizes that the highly variable amount of unused memory partitions cannot be predetermined.

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In greater detail, looking to paragraph [0020] of the Oh patent application, it states:

[0020] Memory Partitions on Demand (MPD) is a remote memory allocation mechanism that allows computers in an infrastructure to contribute their unused memory partitions to other computers. The idea is similar to contributing CPU cycles of under-utilized computers in load-balancing of GRID architecture and Internet-based distributed computing, but in this case the shared resource is the main memory.

Again, nothing here states or suggests that there is any reservation of any space on the computers, and to the contrary there is only discussion of "contribut[ing] their unused memory partitions to other computers". It is submitted that this discussion is more likely to lead one of ordinary skill in the art to understanding that there is no restriction or limitation on the "unused memory partitions" of the computer, and that as long as the memory is "unused", the memory is available to be shared. This is in conflict with the requirement of claim 3, which requires that a portion of the total disk storage space is reserved. The rejection says "at least a portion (i.e. the used memory partition) of the total disk storage space are inherently reserved for local use on each of the at least two grid computers".

However, one of ordinary skill in the art understands that simply because the computer uses some of its own memory does not mean that there is any memory reserved for its own use. Again, paragraph [00200] refers to "unused" memory, which suggests that any memory that is not used is available to be used by the Oh system. The present invention, and this claim requirement, recognizes that some of the "unused" memory of the grid computer (in addition to the memory in use by the grid computer) may need to be reserved for future usage by the grid computer. The Oh system does not recognize such a reservation.

Claim 4 requires "determining the total disk storage space on each of the at least two grid computers and allocating the total disk storage space between a portion made available for use as part of the virtual storage drive and a portion reserved for local use on the grid compute" and "wherein the

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portion available for use as part of the virtual storage space is of a fixed size and the portion reserved for local use on the grid computer is of a fixed size".

The Response to Arguments further states:

With respect to (c), as described above in the rejection of claims 2 and 3, Oh teaches about allocating a portion of the total disk storage space on each of the at least two grid computers (i.e. the unused memory partition of the other/remote computers) to be made available as part of the virtual storage drive (e.g. see paragraph [0020]). Therefore, at least a portion (i.e. the used memory partition) of predetermined size (i.e. the size of the used portion) of the total disk storage space are inherently reserved for local use on each of the at least two grid computers, as claimed in claim 4.

It is submitted that this interpretation of the system of the Oh patent application is not consistent with the requirements of claim 4, particularly as it is amended.

It is therefore submitted that the cited patents, and especially the allegedly obvious combination of Oh, Ebata, Wells, Watkins set forth in the rejection of the Office Action, would not lead one skilled in the art to the applicant's invention as required by the claims.

Withdrawal of the §102(e) and §103(a) rejections of claims 1 through 19 is therefore respectfully requested.

**Paragraph 8 of the Office Action**

Paragraph 8 of the Office Action states that claim 21 would be allowable if written into independent form with the limitations of the base claim and any intervening claims.

The above amendment incorporates the limitations of claim 1 into the recitation of claim 21, and therefore claim 21 is believed to be in condition for allowance.

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CONCLUSION

In light of the foregoing amendments and remarks, early reconsideration and allowance of this application are most courteously solicited.

Respectfully submitted,

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